

What is claimed is:

1. A worm gear mechanism comprising:

a driving worm;

5 a torque-transmitting worm wheel meshing with said worm for transmitting torque from said worm to a load side;

an auxiliary worm wheel meshing with said worm and having a pitch diameter greater than a pitch diameter of said torque-transmitting worm wheel; and

10 a resilient member for resiliently urging said auxiliary worm wheel relative to said torque-transmitting worm wheel,

wherein, at positions where said torque-transmitting worm wheel and said auxiliary worm wheel mesh with said worm, a tooth of said worm is held at opposite surfaces thereof between teeth of said torque-transmitting worm wheel and said auxiliary worm wheel, and

15 wherein said resilient member resiliently urges said auxiliary worm wheel in such a direction as to keep the tooth of said worm held between the teeth.

20 2. A worm gear mechanism as claimed in claim 1 wherein said auxiliary worm wheel is rotatable relative to said torque-transmitting worm wheel about a same rotation center as said torque-transmitting worm wheel.

3. A worm gear mechanism as claimed in claim 1 wherein a pitch diameter of
25 said worm defined when said auxiliary worm wheel is meshing with said worm is smaller than a pitch diameter of said worm defined when said torque-transmitting worm wheel is meshing with said worm.

4. A worm gear mechanism comprising:

a driving worm;

a torque-transmitting worm wheel meshing with said worm for transmitting torque from said worm to a load side;

5 an auxiliary worm wheel meshing with said worm with no backlash and having a pitch diameter greater than a pitch diameter of said torque-transmitting worm wheel; and

a resilient member for, when said auxiliary worm wheel has rotated relative to said torque-transmitting worm wheel, resiliently urging said
10 auxiliary worm wheel in a direction back toward an original rotational position of said auxiliary worm wheel.

5. A worm gear mechanism as claimed in claim 4 wherein said auxiliary worm wheel is rotatable relative to said torque-transmitting worm wheel about
15 a same rotation center as said torque-transmitting worm wheel.

6. A worm gear mechanism as claimed in claim 4 wherein a pitch diameter of said worm defined when said auxiliary worm wheel is meshing with said worm is smaller than a pitch diameter of said worm defined when said torque-transmitting worm wheel is meshing with said worm.
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7. A worm gear mechanism comprising:

a driving worm;

a torque-transmitting worm wheel meshing with said worm for
25 transmitting torque from said worm to a load side;

an auxiliary worm wheel meshing with said worm and positioned in overlapping relation to said torque-transmitting worm wheel, said auxiliary

worm wheel having a pitch diameter greater than a pitch diameter of said torque-transmitting worm wheel; and

a resilient member for resiliently urging said auxiliary worm wheel toward said torque-transmitting worm wheel,

5 wherein a backlash between a tooth of said worm and a tooth of said auxiliary worm wheel is set to be smaller than a backlash between the tooth of said worm and a tooth of said torque-transmitting worm wheel.

8. An electric power steering apparatus for use in a vehicle, said electric
10 power steering apparatus comprising:

a worm gear mechanism;

a steering system extending from a steering wheel to a steerable road wheel of the vehicle; and

15 an electric motor for generating steering assist torque to assist steerage of the steerable road wheel in response to steering operation of the steering wheel or all necessary torque for steerage of the steerable road wheel, and supplying the steering assist torque or all necessary torque to said steering system via said worm gear mechanism;

said worm gear mechanism comprising:

20 a driving worm;

a torque-transmitting worm wheel meshing with said worm for transmitting torque from said worm to a load side;

25 an auxiliary worm wheel meshing with said worm and having a pitch diameter greater than a pitch diameter of said torque-transmitting worm wheel; and

a resilient member for resiliently urging said auxiliary worm wheel relative to said torque-transmitting worm wheel,

wherein, at positions where said torque-transmitting worm wheel and said auxiliary worm wheel mesh with said worm, a tooth of said worm is held at opposite surfaces thereof between teeth of said torque-transmitting worm wheel and said auxiliary worm wheel, and

5 wherein said resilient member resiliently urges said auxiliary worm wheel in such a direction as to keep the tooth of said worm held between the teeth.

9. An electric power steering apparatus as claimed in claim 8 wherein said
10 auxiliary worm wheel is rotatable relative to said torque-transmitting worm wheel about a same rotation center as said torque-transmitting worm wheel.

10. An electric power steering apparatus as claimed in claim 8 wherein a
pitch diameter of said worm defined when said auxiliary worm wheel is
15 meshing with said worm is smaller than a pitch diameter of said worm defined when said torque-transmitting worm wheel is meshing with said worm.

11. An electric power steering apparatus for use in a vehicle, said electric power steering apparatus comprising:

20 a worm gear mechanism;

 a steering system extending from a steering wheel to a steerable road wheel of the vehicle; and

 an electric motor for generating steering assist torque to assist steerage of the steerable road wheel in response to steering operation of the steering
25 wheel or all necessary torque for steerage of the steerable road wheel, and supplying the steering assist torque or all necessary torque to said steering system via said worm gear mechanism;

said worm gear mechanism comprising:

a driving worm;

a torque-transmitting worm wheel meshing with said worm for transmitting torque from said worm to a load side;

5 an auxiliary worm wheel meshing with said worm with no backlash and having a pitch diameter greater than a pitch diameter of said torque-transmitting worm wheel; and

10 a resilient member for, when said auxiliary worm wheel has rotated relative to said torque-transmitting worm wheel, resiliently urging said auxiliary worm wheel in a direction back toward an original rotational position of said auxiliary worm wheel.

12. An electric power steering apparatus as claimed in claim 11 wherein said auxiliary worm wheel is rotatable relative to said torque-transmitting worm
15 wheel about a same rotation center as said torque-transmitting worm wheel.

13. An electric power steering apparatus as claimed in claim 11 wherein a pitch diameter of said worm defined when said auxiliary worm wheel is meshing with said worm is smaller than a pitch diameter of said worm defined
20 when said torque-transmitting worm wheel is meshing with said worm.